

Prototype Carbon Nanotube Ultracapacitor, Phase II

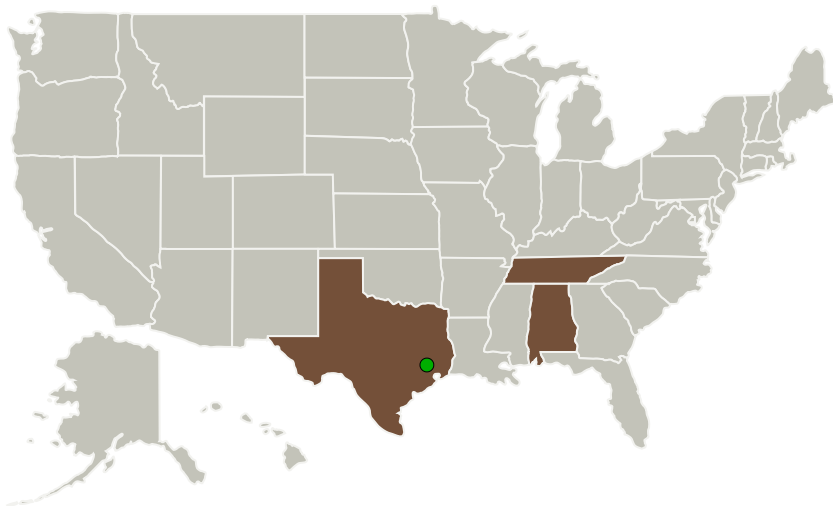
Completed Technology Project (2011 - 2013)



Project Introduction

Scientific, Inc. and Vanderbilt University propose to dramatically improve the performance of ultracapacitors to address several applications within NASA. As power-supply components, ultracapacitors provide extremely high power densities, fast recharging rates, and long cycle life; when used in tandem with batteries, they can greatly extend battery life. We note that ultracapacitors can assume almost any form factor that an application might require. Our recent success with a flexible substrate supports this claim. Finally, commercialization of our ultracapacitor will rely on the use of environmentally friendly materials and well understood industrial manufacturing processes in common use today. We propose to develop a novel hybrid electrochemical ultracapacitor which will combine desirable attributes such as extremely high energy-power density, excellent life-cycle reliability and safety characteristics, with low production cost and have the potential for widespread deployment in energy delivery/storage applications for the NASA. In this innovative, hybrid, demonstrated approach we will grow vertically-aligned carbon nanotubes (CNT) directly on conducting flexible substrates to reduce contact resistances, and we will exploit the more controllable CNT nano-architectures for optimum attachment of inexpensive pseudocapacitive manganese-dioxide (MnO_2) nanoparticles to enhance charge efficiency and energy-power capacity. Our approach employs "green" electrolyte that increases cell voltage.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Scientific, Inc.	Lead Organization	Industry	Huntsville, Alabama
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas
Vanderbilt University	Supporting Organization	Academia	Nashville, Tennessee

Primary U.S. Work Locations

Alabama	Tennessee
Texas	

Project Transitions

▶ **July 2011:** Project Start

✓ **July 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139355>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Scientific, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

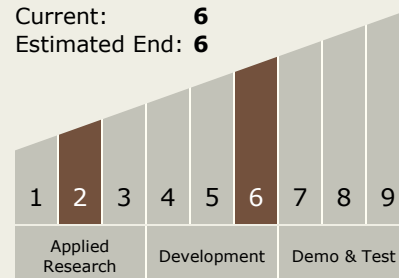
Carlos Torrez

Principal Investigator:

Scott Von Laven

Technology Maturity (TRL)

Start: 2
Current: 6
Estimated End: 6



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.2 Energy Storage
 - └ TX03.2.1 Electrochemical: Batteries

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System